## AMENDMENTS TO THE CLAIMS

1. (Currently Amended) An ICP source for a semiconductor wafer plasma processing apparatus comprising:

an RF generator;

a series RF circuit that includes a substrate support and a peripheral ionization source, including at least one inductive element that generates an RF magnetic field into a plasma, connected to and surrounding the substrate support on the periphery of the substrate support, the substrate support and the peripheral ionization source forming a common planar surface having a substrate support surface at its center;

a matching network coupling the RF generator into the series RF circuit; [[and]]

the RF generator coupling RF energy to the series RF circuit to bias the substrate support surface to capacitively couple to [[a]] the plasma proximate the planar surface and to energize the peripheral ionization source to inductively couple to the plasma proximate the planar surface, thereby forming a high density plasma across the planar surface by both capacitively and inductively coupling energy thereto from the series RF circuit; and

a slotted Faraday shield between the inductive element and the plasma for facilitating the inductive coupling of energy from the inductive element into the plasma and for limiting the capacitive coupling of energy from the inductive element to the plasma.

2. (Canceled).

3. (Original) The ICP source of claim 1 wherein:

the peripheral ionization source includes an annular inductive element that surrounds the substrate support surface.

4. (Previously Presented) The ICP source of claim 1 wherein:

the peripheral ionization source includes an annular antenna that surrounds the substrate support surface and is capacitively-coupled in series with the substrate support surface to form the RF series circuit.

5. (Original) The ICP source of claim 1 wherein:

the matching network is connected to an output of the RF generator; and

the peripheral ionization source is capacitively connected at one end thereof to the matching network and is capacitively-coupled at an opposite end thereof to the substrate support surface.

6. (Original) The ICP source of claim 1 wherein:

the matching network is capacitively-coupled to the substrate support surface; and

the peripheral ionization source is capacitively-coupled to the substrate support surface and is capacitively-coupled to the chamber ground.

7. (Original) The ICP source of claim 1 wherein:

the substrate support surface is an electrostatic chuck.

8. (Original) The ICP source of claim 1 wherein:

the RF generator is the sole source of RF energy to the substrate support surface and the peripheral ionization source.

9. (Original) The ICP source of claim 1 wherein:

the peripheral ionization source is capacitively-coupled to the substrate support surface; and

the matching network has impedances in series with the peripheral ionization source that are approximately tuned to the frequency of the RF generator.

10. (Original) The ICP source of claim 1 wherein:

the peripheral ionization source is configured to inductively couple RF energy into the plasma to form a high density ring-shaped plasma concentrated in the direction of the perimeter of the substrate support surface.

11. (Original) The ICP source of claim 1 wherein:

the matching network is capacitively-coupled to the substrate support surface;

the matching network has an input and an output and includes an inductor connected in series between the input and output; and

the peripheral ionization source is connected in series with the inductor of the matching network.

12. (Original) The ICP source of claim 1 wherein:

the matching network is capacitively-coupled to the substrate support surface;

the matching network has an input and an output and includes an inductor connected in series between the input and output; and

the peripheral ionization source is connected in parallel with the inductor of the matching network.

13. (Original) The ICP source of claim 1 wherein:

the matching network is capacitively-coupled to the substrate support surface; and

the matching network has an input and an output and has the peripheral ionization source connected in series between the input and output in lieu of a separate inductor.

14. (Original) The ICP source of claim 1 wherein:

the matching network is capacitively-coupled to the substrate support surface;

the matching network has an input and an output and has the peripheral ionization source connected in series between the input and output in lieu of a separate inductor; and

the peripheral ionization source includes individual inductive elements connected in series through stray mutual capacitance.

15. (Original) The ICP source of claim 1 wherein:

the peripheral ionization source has a segmented configuration of alternating high and low-radiation sections arranged in a ring and positioned to couple power in an annular alternating high and low power distribution.

16. (Previously Presented) The ICP source of claim 15 further comprising:

a shield having a segmented configuration of alternating high and low-transparency sections arranged in a ring and positioned to facilitate the coupling of power therethrough in the annular alternating high and low power distribution;

the high-radiation sections of the peripheral ionization source include the high-transparency sections of the shield; and

the low radiation sections of the peripheral ionization source include the low-transparency sections of the shield.

17. (Previously Presented) The ICP source of claim 16 wherein:

the source includes a dielectric chamber wall and an antenna having a segmented configuration that includes a plurality of spatially concentrated conductor segments thereof parallel to the dielectric chamber wall and perpendicular to the slots and aligned with the high-transparency sections of the shield, and a plurality of spatially distributed conductor segments aligned with the low-transparency sections of the shield; and

the high-radiation sections of the peripheral ionization source include the spatially concentrated conductor segments and the low radiation sections of the peripheral ionization source including the low-transparency sections of the shield.

18. (Currently Amended) An ICP source for a semiconductor wafer processing apparatus comprising:

an RF generator;

a substrate support surface;

a peripheral ionization source connected to and surrounding the substrate support surface at and around the periphery thereof and lying in a common plane therewith; [[and]]

the peripheral ionization source having a segmented configuration of alternating high and low-radiation sections arranged in a ring and positioned to couple power into a plasma over the substrate support surface in an annular alternating high and low power distribution;

the peripheral ionization source includes a shield having a segmented configuration of alternating high and low-transparency sections arranged in a ring and positioned to facilitate the coupling of therethrough in the annular alternating high and low power distribution;

the high-radiation sections of the peripheral ionization source include the high-transparency sections of the shield;

the low radiation sections of the peripheral ionization source include the low-transparency sections of the shield;

the high-transparency sections of the shield have a plurality of slots therethrough; and

the low-transparency sections of the shield are electrically conductive and generally solid relative to the high-transparency sections.

19. (Canceled).

20. (Currently Amended) The ICP source of claim [[19]] 18 wherein:

the source includes a dielectric chamber wall and an antenna having a segmented configuration that includes a plurality of spatially concentrated conductor segments thereof parallel to the dielectric chamber wall and perpendicular to the slots and aligned with the high-transparency sections of the shield, and a plurality of spatially distributed conductor segments aligned with the low-transparency sections of the shield;

the high-radiation sections of the peripheral ionization source include the spatially concentrated conductor segments; and

the low radiation sections of the peripheral ionization source include the low-transparency sections of the shield.

Claims 21-25. (Canceled).

26. (New) An ICP source for a semiconductor wafer plasma processing apparatus having a vacuum chamber comprising:

an RF generator located outside of the vacuum chamber;

a series RF circuit that includes a substrate support and a peripheral ionization source, including at least one inductive element that generates an RF magnetic field into a plasma, connected to and surrounding the substrate support on the periphery of the substrate support, the substrate support and the peripheral ionization source fixed in a common plane with a substrate support surface;

the peripheral ionization source being located inside of the vacuum chamber;

a matching network coupling the RF generator into the series RF circuit;

the RF generator coupling RF energy to the series RF circuit to bias the substrate support surface to capacitively couple to the plasma proximate the planar surface and to energize the peripheral ionization source to inductively couple to the plasma proximate the planar surface, thereby forming a high density plasma across the planar surface by both capacitively and inductively coupling energy thereto from the series RF circuit; and

a slotted Faraday shield between the inductive element and the plasma for facilitating the inductive coupling of energy from the inductive element into the plasma and for limiting the capacitive coupling of energy from the inductive element to the plasma, wherein the slotted Faraday shield is located inside of the vacuum chamber.